

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/775366

Filing Date: February 1, 2001

Title: ELECTRONIC DEVICE PACKAGE

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REMARKS

Claims 1-52, 108-154, 252-269 are now pending in this application. Applicant does not admit that the cited references are prior art and reserves the right to “swear behind” each of the cited references as provided under 37 C.F.R. 1.131.

§103 Rejection of the Claims

Claims 1-52, 108-126, 136-154, and 252-269 were rejected under 35 USC § 103(a) as being unpatentable over the admitted prior art (APA) in view of Yamamoto et al. (U.S. 6,265,782), Penry (U.S. 6,049,094), Satsu et al. (U.S. 6,225,418) and Narita (U.S. 6,144,107).

With regard to claims 1-52, 108-126, 136-154, and 252-269, as set forth in the remarks of the response to the Office Action dated June 5, 2002, claims 1-52 and 108-154 were rejected in view of four references. Relevant to claims 1-52, 108-126, 136-154, and 252-269, Applicant reiterates the remarks set forth in the response to the Office Action dated June 5, 2002 for claims 1-52 and 108-154.

In particular, claims 1-52, 108-126, 136-154, and 252-269 were rejected in view of four references. The office action must provide specific, objective evidence of record for a finding of a suggestion or motivation to combine reference teachings and must explain the reasoning by which the evidence is deemed to support such a finding. *In re Sang Su Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). Since the office action fails to address this issue, the office action fails to support a finding of a suggestion or motivation to combine the teachings of the four references. Hence, the office action fails to meet the legal standard of *In re Sang Su Lee*. Thus, the office action fails to state a *prima facie* case of obviousness with respect to claims 1-52, 108-126, 136-154, and 252-269. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 1-52, 108-126, 136-154, and 252-269.

Claims 1-17 and 108-126

With regard to claims 1 and 108, such claims recite “a material having a Young’s modulus of between .1 megapascals and about 20 megapascals.” The Office Action rejected these claims in light of Yamamoto and the APA. Applicant respectfully traverses this rejection.

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In the "Response to Arguments" section, the Office Action alleges that "[t]he prior art teachings of Yamamoto et al, Penry, Satsu et al and Narita is applied to the APA [Admitted Prior Art] to achieve the claimed ranges/values for the die attach material parameters including modulus, CTE and hardness." Office Action at ¶3A. The Office Action also alleges that

the determination of such parameters and arriving at a desired range of YM [Young's Modulus], hardness, viscosity, TEC, etc. of a die attach material having different composition in chip packaging/encapsulation technology art is a subject of routine experimentation and optimization to achieve the desired thermal, mechanical and electrical properties for the IC package. (emphasis added) Office Action at ¶3A.

Applicant respectfully traverses this assertion. "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." (emphasis added) MPEP 2143.

Yamamoto describes "a storage elastic modulus at 260°C of from 3 to 50 MPa . . ." Yamamoto at column 3, lines 33-34. Yamamoto does not disclose or suggest a modification of this material such that the modulus of the material is in a range of about 0.1 MPa and about 20 MPa. With regard to ranges, as set forth under MPEP 2144.05,

Applicants can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. . . . A prima facie case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997). MPEP 2144.05.

Applicant respectfully submits that multiple citations within Yamamoto teaches away from a die attach material that is less than 3MPa. For example, Yamamoto teaches that

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[t]he adhesive of the present invention must have storage elastic moduli at 25°C of from 20 to 2,000MPa and at 260°C of from 3 to 50 MPa, which are low moduli of elasticity, as measured with a dynamic viscoelastic spectrometer. (emphasis added) Yamamoto at column 14, lines 26-30.

A second citation within Yamamoto also teaches away from a material having a modulus that is not below 3 MPa. In particular, "the comparative example 7" in Table 2 of Yamamoto indicates that the "adhesive film handling properties" are "poor" for a material having a modulus of 1 at 260°C. (See Yamamoto at column 27). With regard to this example, Yamamoto states that

[i]n Comparative Example 7, the epoxy-group-containing acrylic copolymer specified in the present invention is in so large a quantity that the adhesive, though having low and good storage elastic moduli, makes handling properties of the adhesive poor. (emphasis added) Yamamoto at column 27, lines 52-56.

Additionally, a third citation within Yamamoto teaches away from a material having a modulus that is not below 3 MPa. In particular, "the Comparative Example 13" in Table 3 of Yamamoto indicates that both the "electrolytic corrosion resistance" and the "moisture resistance (PCT resistance) are "poor" for a material having a modulus of 2 at 260°C. (See Yamamoto at column 31). With regard to this example, Yamamoto states that

[i]n the Comparative Example 13, the epoxy-group-containing acrylic copolymer specified in the present invention is not contained but the storage elastic modulus at 25°C is adjusted to the one specified in the present invention, showing poor results on electrolytic corrosion resistance and PCT resistance. (emphasis added) Yamamoto at column 31, lines 44-49.

Because Yamamoto teaches away from material having a modulus of less than 3, Applicant respectfully submits that a *prima facie* case of obviousness has not been established for claims 1 and 108. Claims 2-17 are dependent on claim 1. Claims 109-126 are dependent on claim 108. For reasons analogous to those provided above and the elements in the claims, Applicant respectfully submits that the office action fails to state a *prima facie* case of

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obviousness with respect to claims 2-17 and 109-126. Therefore, Applicant respectfully submits that the rejections of claims 1-17 and 108-126 have been overcome and that these claims are in condition for allowance.

Claims 35-52 and 136-154

With regard to claims 35 and 136, such claims recite “a rigid die attach material.” In the “Response to the Arguments” section, the Office Action responded to Applicant’s remarks in a response to the Office Action mailed on June 5, 2002 regarding this limitation. In particular, in the prior response, Applicant set forth citations within Yamamoto wherein the adhesive film has “no rigidity.” See Yamamoto at column 18, lines 25-30. The Office Action responded that

Yamamoto et al further teach solving the problems encountered by the conventional adhesive films having low rigidity by using a variety of epoxy/acrylic/polyimide formulations having a thermosetting/rigid properties in a cured/final stage (Col. 18, line 32 – Col. 20, line 58). Office Action at ¶3B.

Applicant respectfully traverses this assertion. This citation in Yamamoto discloses “the measures as shown . . . have solved problems concerning handling properties of conventional adhesive films with a low modulus of elasticity, caused by low rigidity . . .” (emphasis added) Yamamoto at column 18, lines 30-34. In particular, the “heat-resistant thermoplastic film” is used as the “core material” of the “triple-layer structure”, thereby making “it easy to handle the adhesive film having a low modulus of elasticity” and restraining “the adhesive film from undergoing plastic deformation at the time of reflowing.” (emphasis added) Yamamoto at column 18, lines 35-42. Accordingly, this citation in Yamamoto relates to the resolving problems related to handling of the material and not a change in the lack of rigidity of the material. Therefore, Applicant respectfully submits that a *prima facie* case of obviousness has not been established with regard to claims 35 and 136. For reasons analogous to those provided above and the elements in the claims, Applicant respectfully submits that the office action fails to state a *prima facie* case of obviousness with respect to claims 36-52 and 137-154. Therefore, Applicant respectfully submits that the rejections of claims 35-52 and 136-154 have been overcome and that these claims are in condition for allowance.

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Claims 18-34 and 252-269

With regard to claim 18, among the differences, claim 18, as amended, recites "a material having a coefficient of thermal expansion α_2 of less than about 400 (four-hundred) ppm/ $^{\circ}$ C attaching the die to the substrate, wherein the material has a Young's modulus of between .1 megapascals and about 20 megapascals, at a solder reflow temperature (emphasis added). With regard to claim 252, among the differences, claim 252, as amended, recites "a material having a coefficient of thermal expansion α_2 of between about one and about sixty-two ppm/ $^{\circ}$ C attaching the die to the substrate, wherein the material has a Young's modulus of between .1 megapascals and about 20 megapascals, at a solder reflow temperature (emphasis added). With regard to claim 261, among the differences claim 261, as amended, recites "a material having a coefficient of thermal expansion α_2 of between about 151 (one-hundred and fifty-one) and about 400 (four-hundred)] ppm/ $^{\circ}$ C attaching the die to the substrate, wherein the material has a Young's modulus of between .1 megapascals and about 20 megapascals, at a solder reflow temperature."

(emphasis added). In light of the remarks set forth above regarding claims 1 and 108, Applicant respectfully submits that the rejections of claims 18, 252 and 261 have been overcome and that these claims are in condition for allowance. Because claims 19-34, 253-260 and 262-269 depend from and further define claims 18, 252 and 261, respectively, Applicant respectfully submits that the rejections of claims 19-34, 253-260 and 262-269 have been overcome and that these claims are in condition for allowance.

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Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, Greg Peacock (612) 371-2103 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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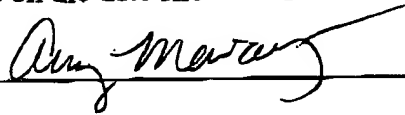
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By


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